

PROGRAM AREA: Fruit Quality and Production

PROJECT LEADER AND TITLE: J. M. Ogawa, Plant Pathologist

PERSONNEL: Pomology: K. Uriu, Agricultural Engineering: W. E. Yates,
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OBJECTIVES: To develop control programs for preharvest and postharvest fungus diseases of prunes.

1. Determine cause of russet scab and develop control measures with chemicals. Evaluate the new benzimidazole compounds (Benlate and Topsin M) for russet scab control. (Long range - 5 yrs.)
2. Evaluate the effect of postharvest molds on prune fruit and develop decay control using foam-fungicides during mechanical harvest. (Short range - 3 yrs.)
3. Study long-distant spread of brown rot spores by insect and wind from orchard to orchard and determine conditions for fruit infections in periods with and without rains. (Long range - 5 yrs.)
4. Study life cycle of leaf rust fungus and evaluate crop losses. (Long range - 5 to 10 yrs.)

WORK IN PROGRESS:

1. Russet scab: Prune orchard established on the Davis campus is being set up for overhead sprinkling to determine the amount of simulated rain required to induce russet scab. Screening of new chemicals for control including inactive fillers is planned. Tests with benzimidazoles will be made in Healdsburg at the Hiatt ranch, Colusa County, Santa Clara County and the State of Oregon, Dalles area. Evaluation of prune cracks will be made in cooperation with Pomology (Dr. Uriu).
2. Postharvest molds: Isolations of molds from fruit will be continued. Decayed fruit will be evaluated for quality (flavor only) and possible mycotoxin production. Fungicides, approved by the EPA, have been incorporated in foam. The foaming agent has been re-formulated to reduce phytotoxicity. Mechanically harvested fruit will be treated with foam-fungicide and evaluated for decay control.
3. Brown rot: Very little is known about the nature of preharvest fruit rot development. No control recommendation can now be made. Current studies of spore dissemination implicate insect vectors as well as wind. Spore movement from peach orchards into prune orchards is suspected. A new spore trap with high-air volume intake is being developed to study aerial dissemination.
4. Leaf rust: Rust of stone fruit is becoming more prevalent. The effect of early leaf fall on tree vigor and crop yield the following year should be studied. The overwintering stages must be determined to establish the inoculum source for summer infections. Young trees in the greenhouse have been inoculated to determine methods of overwintering under optimum conditions.

EXPERIMENTS COMPLETED:1. Russet scab:

- a. development of chemical control using captan, dichlone or wettable sulfur at full bloom.
- b. disease associated with rains during bloom.

2. Postharvest molds:

- a. two years of fungus isolations and reinoculations of fruit to test pathogenicity.
- b. formulation of foam-fungicide treatment to be used on the mechanical harvester.

3. Brown rot:

- a. use of sodium pentachlorophenate during winter or the use of Benlate plus oil before sporodochial development for control of M. laxa.
- b. green bud and full-bloom sprays with protectants, such as captan, dichlone or nabam plus salts.
- c. single early-petal spray with benzimidazole fungicides, such as Benlate or Topsin M (Benlate registered but Topsin unregistered).
- d. studies with low concentrations of Benlate showed chelation with heavy metals reducing its activity. Incompatibility of Benlate with alkaline materials, such as Bordeaux mixture. Systemic activity of Benlate in blossom parts.

4. Leaf rust:

- a. control of leaf rust with Dithianon, maneb or wettable sulfur after first sign of rust pustules on leaves.
- b. spore release and infection occur in early morning in presence of high humidity or moisture.

WORK PLANNED:1. Russet scab:

- a. effectiveness of benzimidazoles (Benlate & Topsin M) at early petal stage of bloom. If effective, a single application can control both brown rot and scab.
- b. use of aircraft application during rainy seasons.
- c. cause of russet scab to be studied on UCD campus using overhead sprinklers.

2. Postharvest molds:

- a. test foam-fungicide treatments for decay control.
- b. study decay development and evaluate their effect on fruit quality (flavor only), mycotoxin production and detection during processing.

3. Brown rot:

- a. aircraft applications using 10 gallons per acre during early petal stage of bloom.
- b. preharvest fruit rot development - importance of insects and wind on spread of spores from orchard to orchard.
- c. mechanism of action of benzimidazole compounds.
- d. effect of sprinkler irrigation on fruit brown rot development.

4. Leaf rust:

- a. effectiveness of aircraft fungicide applications.
- b. life cycle study with emphasis on the overwintering stage of the fungus.
- c. effect of defoliation on tree vigor and crop loss.

MAJOR ACCOMPLISHMENTS:

1. Fungicide deposit from low gallonage aircraft application can be as high as 85% of conventional ground application.
2. Formulation of foam-fungicide combinations to use on mechanical harvesters for postharvest decay control.
3. Designed a spore trap for possible use in trapping spores by aircraft or in area distant from the orchard.

IMMEDIATELY APPLICABLE RESEARCH RESULTS:

1. Russet scab develops in years when rainfall is excessive during bloom. If overhead sprinkler irrigation becomes a common practice then, sprinkling during bloom must be given careful consideration.
2. Testing of foam-fungicide treater.

EVALUATION OF PROJECT:

Research on brown rot blossom blight control has resulted in higher yields with less decayed fruit at harvest. Aircraft applications can cover large acreage very quickly during the critical infection period. Application costs can be reduced substantially. Postharvest molds may produce mycotoxins, cause off flavor and poor quality. Studies of spore levels and dissemination can be used to forecast the need for preharvest fungicides in the event of unseasonal rain. A life cycle study of the rust fungus will provide the necessary information for adequate disease control.

PUBLICATIONS OR REPORTS:

1. Ravetto, D. J. and J. M. Ogawa. 1972. Penetration of peach fruit by benomyl (methyl 1-(butylcarbamoyl)-2-benzimidazole carbamate and Botran (2,6-dichloro-4-nitroaniline) fungicides. Phytopathology 62:784. (Abstr.) Note: Prune fruits are more difficult to penetrate with fungicides.
2. Ogawa, J. M., W. E. Yates, B. T. Manji and R. E. Cowden. 1972. Ground and aircraft applications of thiophanate-methyl on control of stone fruit brown-rot blossom blight. Phytopathology 62:781. (Abstr.)